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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/074,855	02/11/2002	Mark A. Perrin	5694/CPI/COPPER	6840

32588 7590 10/17/2003

APPLIED MATERIALS, INC.
2881 SCOTT BLVD. M/S 2061
SANTA CLARA, CA 95050

EXAMINER	
MCDONALD, RODNEY GLENN	
ART UNIT	PAPER NUMBER
1753	3

DATE MAILED: 10/17/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 10/074,855	Applicant(s) PERRIN, MARK A.
	Examiner Rodney G. McDonald	Art Unit 1753

-- Th MAILING DATE of this communication appears on th cov r she t with the correspond nce address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on _____ .

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-47* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☒ Claim(s) *19-29 and 38-47* is/are allowed.

6)☒ Claim(s) *1,16-18,30,32,36 and 37* is/are rejected.

7)☒ Claim(s) *2-15,31 and 33-35* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 2 .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other:

DETAILED ACTION

Claim Rejections - 35 USC § 112

Claims 16 and 42 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claims 16 and 42 are indefinite because it is unclear why the cathode should be biased to ground when the cathode is typically biased negatively in order to cause sputtering. It suggested that the "anode " should be biased to ground and the word "cathode" be changed to the word "anode".

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 1 and 16-18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Corbani (U.S. Pat. 3,878,085) in view of Haag et al. (U.S. Pat. 6,337,001).

Corbani teach in Figs. 14 and 16 a circular cathode sputtering apparatus 210. ***It includes a central magnetic pole piece 211 formed as a post, a peripheral pole piece 212 formed as a cylinder, and a ring-shaped magnet 213 between them, magnetized with a pole adjacent to each pole piece.*** (This is the required magnet for producing a toroidal magnetic field) A ring-shaped cathode support 214 lies between the pole pieces and includes ***a conductive metallic coolant conduit 215 for cooling***

and providing cathode potential. (This is the required cathode potential) A cathode 216 is held in a groove 217 in a side plate 218 which surrounds the structure. Magnetic lines of force 219 are generated and form a circular path 220 with intersections 221, 222, with the cathode, and continuously arched segments 223. A ring-shaped anode 224 (shown only in Fig. 16) is placed adjacent to the cathode and has connector means (not shown) for providing anode potential. (Column 8 lines 55-68; Column 9 lines 1-4) From Figures 14 and 16 the cathode is donut shaped with a torus interior. (See Figures 14 and 16)

In the devices of Figs. 1-12, 15 and 16, the material to be sputtered will ordinarily be metallic and non-magnetic, such as copper or gold. It is possible with this invention to sputter insulating materials and also magnetic materials. (Column 9 lines 5-9)

In operation the ***sputtering takes place in an evacuated enclosure*** with a substrate which is also contained in the evacuable enclosure. (Column 2 lines 21-24) A plasma is generated between the cathode 216 and the anode 224 to sputter material on a substrate. (Column 1 lines 1-15; See Figures 14 and 16)

The differences between Corbani and the present claims is the use of a ring shaped anode positioned in the interior of the cathode.

Haag et al. teach an apparatus with two mutually opposite sputtering surfaces of at least one target that are self-enclosed such that a closed loop gap, and consequently a closed loop plasma discharge space, is formed. A gas flow is created between the sputtering surfaces and directed against workpieces. No gap ends exist on the closed loop gap so that electrons that move along and within the plasma loop can recirculate

until most of their energy has been transferred through impacts to the gas particles. (See Abstract)

According to Fig. 9 a source 16 is installed in one of the systems according to the invention. This source is located opposite a schematically represented workpiece holder 32. It can be designed in accordance with one of the versions illustrates in Fig. 1 to 8. The gap area of gap 5 is located opposite the gas exit opening 10 is closed and supports ***a closed loop anode ring 34***. At the gap termination 36 there is a gas distribution space 38 which, for example is fed by a closed loop ring line 40 from a gas tank arrangement 42 which contains preferably an inert gas such as a noble gas, for example, Ar. (Column 5 lines 38-47) Anodes are preferably operated with connection to ground. (Column 4 lines 24)

The motivation for utilizing an anode positioned in the interior of the cathode is that it allows for generating plasma and controlling the particle energy. (Column 4 lines 16-27)

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have modified Corbani by utilizing an anode positioned in the interior of a cathode as taught by Haag et al. because it allows for generating a plasma and controlling particle energy.

Claims 30, 32, 36 and 37 are rejected under 35 U.S.C. 103(a) as being unpatentable over Corbani in view of Haag et al. as applied to claims 1 and 16-18 above, and further in view of Hurwitt et al. (U.S. Pat. 5,080,772).

The differences not yet discussed is the deposition on a semiconductor substrate.

Hurwitt teach depositing a layer on a semiconductor wafer utilizing a concave target with anode. (See Hurwitt Abstract)

The motivation for depositing on a semiconductor wafer from a concave cathode with anode is that it allows deposition of uniform films on substrate surfaces. (Column 2 lines 55-61)

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have utilized a semiconductor wafer substrate as taught by Hurwitt because it allows for deposition of uniform films on substrate surfaces.

Allowable Subject Matter

Claims 19-29 and 38-47 are allowed.

Claims 2-15, 31 and 33-35 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

The following is a statement of reasons for the indication of allowable subject matter:

Claims 2-15 are allowable over the prior art of record because the prior art of record does not teach a cathode defining a central axis exterior to the cathode and the cathode interior sputtered surface defining a central interior axis which is ring-shaped and forms a closed loop around the exterior central axis, the anode being ring-shaped

and defining a ring-shaped center axis coaxially aligned with the cathode central interior axis.

Claims 19-26 are allowable over the prior art of record because the prior art of record does not teach the toroidal cathode with the plurality of passageways positioned between the exterior surface and the sputtering surface and oriented to permit ionized sputtered deposition material discharged from the plasma generation region, to pass through the cathode and to the exterior of the cathode and the anode positioned within the vessel adjacent to the plasma generation region and facing the cathode interior sputtering surface.

Claim 27 is allowable over the prior art of record because the prior art of record does not teach the claimed subject matter including the cathode having a plurality of passageways positioned between the exterior surface and the sputtering surface and oriented to permit ionized sputtered deposition material discharge to the exterior of the cathode.

Claims 28 and 29 are allowable over the prior art of record because the prior art of record does not teach the claimed subjected matter including the cathode having a plurality of passageways positioned between the exterior surface and the sputtering surface and oriented to permit ionized sputtered deposition material discharge to the exterior of the cathode.

Claims 31 and 33-35 are indicated as being allowable over the prior art of record because the prior art of record does not teach the cathode having a plurality of apertures positioned to discharge sputtered deposition material from the interior of the

cathode, the method further comprising positioning the semiconductor workpiece within the vessel interior to face the sputtering surface apertures to receive sputtered deposition material form the interior of the cathode.

Claims 38-45 are allowable over the prior art of record because the prior art of record does not teach the method as claimed including directing ionized deposition material through a plurality of apertures in the cathode to the exterior of the cathode and onto the substrate.

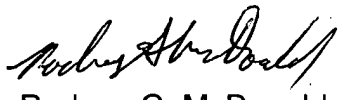
Claim 46 is allowable over the prior art of record because the prior art of record does not teach the subject matter as claimed including the plurality of apertures in the cathode in combination with the torus-shaped magnetic field.

Claim 47 is allowable over the prior art of record because the prior art of record does not teach the claimed subject matter including the plurality of apertures in the cathode in combination with the torus-shaped magnetic field.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Rodney G. McDonald whose telephone number is 703-308-3807. The examiner can normally be reached on M- Th with Every other Friday off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nam X. Nguyen can be reached on 703-308-3322. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0661.



Rodney G. McDonald
Primary Examiner
Art Unit 1753

RM
October 6, 2003